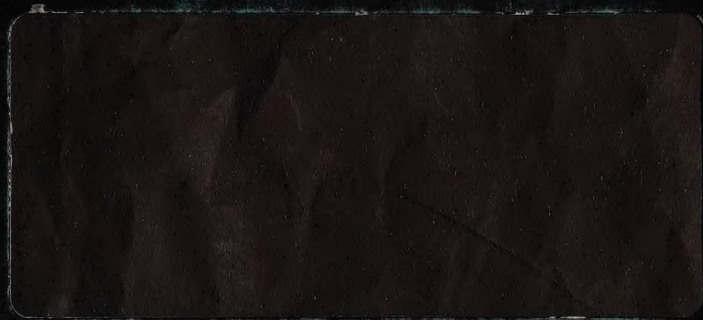
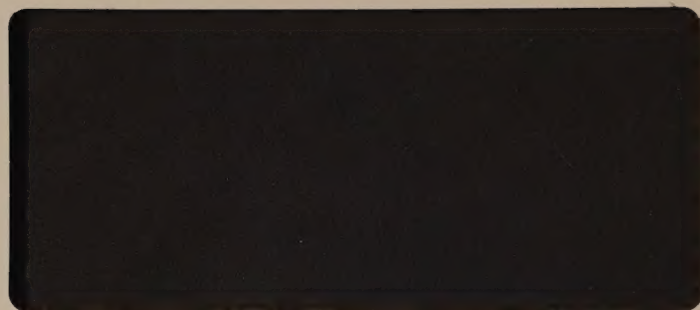




LeCroy



LEAGUE

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LeCROY Research Systems Corp. warrants that instruments it manufactures to be free from defects in material and workmanship under normal use and service for the period of 1-year from date of purchase. Control instruments and systems and separately and all parts or replacement parts are warranted for 90 days. This warranty extends only to the original purchaser. The warranty shall not apply to tests, displays, detectors, or other accessories or parts which have been repaired or replaced, modified, altered or replaced by others.

MANUAL CD8828B

CONTROL AND DISPLAY

In the event of a defect in any instrument or part thereof, LeCROY will repair or replace the instrument or part at its option. The cost of an authorized service call by LeCROY or its authorized representative to the purchaser's location shall be the responsibility of the purchaser. The purchaser may, at its option, return the product to LeCROY for repair. With regard to the instrument returned within one year of the original purchase, and repairs or replacement will be made without charge. If the failure has been caused by misuse, neglect, accident or shipping conditions or operations, repairs will be billed at a normal rate. In such cases, an estimate will be submitted when it is desired if requested.

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Revised
June, 1984

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IN EVENT OF DAMAGE IN SHIPMENT to original purchaser the instrument should be thoroughly inspected immediately upon original delivery to purchaser. All material in the container should be checked against the enclosed packing list. The manufacturer will not be responsible for shortages against the packing sheet unless notified immediately. If the instrument is damaged in any way, a claim should be filed with the carrier immediately. (To obtain a quotation to repair shipment damage, contact the LeCroy factory or the nearest service facility).

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ANY APPLICATION OR USE QUESTIONS, which will enhance your use of this instrument will be happily answered by a member of our Engineering Services Department, telephone 914-425-2000 or your local distributor. You may address any correspondence to:

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CRATE POWER SHOULD BE TURNED OFF DURING INSERTION AND
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Manual Control and Display Module Model CD8828B

Features:

- Convert any CAMAC crate into a multichannel digital oscilloscope
- Display stored data from these LeCroy transient recorders: TR8837F, TR8818, TR8828B
- Manually setup programmable sampling parameters
- Ideally suited for stand alone instrument operation — the benefits of CAMAC instrumentation can be realized without time consuming computer programming
- Provides local control and fast testing of instrumentation modules in large systems
- Fast centralized display for up to 23 different transient recorder channels

The Model CD8828B Control and Display Module (CD) is a supplementary module to the new generation of high performance low cost transient recorders, which are offered by LeCroy. By isolating manual control and display capabilities in a separate module, multichannel instruments can be configured without sacrificing features and cost effectiveness.

The CD8828B plugs into any slot (except the crate controller station) in a CAMAC crate/minicrate. Data stored in the solid state memory of the TR8837F, TR8818 or the TR8828B is retrieved by the CD. This data is used to reconstruct the original signal. The transient recorders all have programmable features which can be set either by computer, or by this module. All data transferral and register loading is done via the CAMAC dataway. As an aid to the system engineer, the CD can be inhibited (under program control) to assure that the dataway is quiescent for normal CAMAC operations. Computer controlled experiments can then proceed without bus contention.

The CD8828B can be used: as a tool for acquiring and/or displaying waveforms quickly; for rapid functional testing of hardware in multichannel transient recorder installations; as a general software debugging tool — by providing for manual loading of the transient recorder's programmable registers.



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Innovators in Instrumentation

SPECIFICATIONS

Model CD8828B

Manual Control and Display Module

GENERAL OPERATION

- To set the sampling parameters of, control, or display data from, any of the supported transient recorders, the transient recorder must have its CD SELECT input connected to the SELECT output on the control and display unit.
- Setup:** The desired sampling parameters are entered using front panel rotary and dip switches. These parameters are then sent via the CAMAC dataway to the instrument when the appropriate EXECUTE switch is toggled.
- Control:** The unit may also be started and triggered by using the START/STOP TRIGGER SWITCH.
- Display:** To display data from a transient recorder, the correct data format is selected using the DATA FORMAT rotary switch and then DISPLAY ON is depressed. The CD8828B then retrieves the data from the connected/selected transient recorder for display.

FRONT PANEL INDICATORS AND CONTROLS

- ACTIVE:** LED is lit when unit is using the CAMAC data bus for transferring data/commands.
- INHIBIT:** LED is lit to indicate that the unit is inhibited, that is no front panel operations will permit bus operations. See F(24)•A(1) and F(26)•A(1) under CAMAC commands.
- Power:** LED is lit when the correct operational voltages are supplied to the CD8828B. Will not necessarily indicate overvoltages.
- CLOCK FREQUENCY:** Rotary switch sets the sampling interval for the supported transient recorders. The selection is made in fractions of the master oscillator. For example if the switch is set to F/2 for the TR8837F 32 MHz transient recorder, the sampling rate will be 16 MHz. The value selection must be succeeded by an EXECUTE, to actually load the value into the transient recorder.
- PRE TRIGGER:** Rotary switch sets the pretrigger record length in eighths of the total record length. The value selection must be succeeded by an EXECUTE, to actually load the value into the transient recorder.
- MEM SIZE:** Dip switches. Data entered using dip switches d1-d8 correspond to data written to the transient recorders on the CAMAC W9-W14 lines using an F(16)•A(0). The table below gives some of the dip switch settings which must be set to achieve the corresponding memory size, for the supported transient recorders.

d1 - d8	TR8837F	TR8818	TR8828B
00000000	1k	8k	8k
00000001	2k	16k	16k
00000010	3k	24k	24k
00000011	4k	32k	32k
00000100	5k	40k	40k
00000101	6k	48k	48k
00000110	7k	56k	56k
00000111	8k	64k	64k
00001000	—	72k	72k
00001001	—	80k	80k
•	—	•	•
•	—	•	•
•	—	•	•
11111111	—	512k	512k

- OFFSET:** Dip switches. The ± 256 mV offset of the transient recorders is settable using these 8 dip switches. The 8 bits of the dip switch settings d1-d8 correspond to the 8 bits which are written into the instrumentation modules using F(19)•A(0). OFFSET is not used for the TR8837, which does not have programmable offset. The table below gives some of the dip switch settings and the corresponding offset value that will be set when EXECUTE is performed.

d1 - d8	approximate offset
00000000	-256 mV
00011100	-200 mV
01001110	-100 mV
10000000	0 mV
10110010	+100 mV
11100100	+200 mV
11111111	+256 mV

- EXECUTE:** Two single throw switches. Used to enter the selected sampling parameters into the connected transient recorder. Throwing left switch upward enters the CLOCK FREQUENCY, PRE TRIGGER and MEM SIZE. Throwing right switch upwards enters the OFFSET value.
- START/STOP TRIGGER:** Double throw switch. Upward deflection starts selected transient recorder. Downward deflection supplies a stop trigger to the selected digitizer.
- DATA FORMAT:** Rotary Switch, selects the correct data decoding mode for the control and display unit. Is used to distinguish between different resolution and differently formatted transient recorder data. Set to 8 BITS for model TR8837F. Set to 2 X 8 BITS for the TR8818 and TR8828B.
- ANALOG:** 0 to 2.5 V output, $Z = 50 \Omega$, drives oscilloscope
- TRIGGER:** Positive TTL level 40 μ sec pulse — Synchronizes TR8837 display on leading edge — Synchronizes TR8818/TR8828B display on trailing edge — output precursor to first sample in record.
- SELECT:** Output, TTL. Must be connected to the CD SELECT input of the transient recorder which is going to have its sampling parameters modified or data viewed.
- PACKAGING** In full mechanical conformance (only) with CAMAC standard for instrumentation modules (IEEE Standard 583, European ESONE Report #EUR4100e). In full electrical conformance when inhibited. RF shielded #2 module.

POWER CONSUMPTION

+6 V at 500 mA, +24 V at 100 mA, -24 V at 100 mA.

ORDERING INFORMATION

Specify the Model CD8828B. The model LE/BC-3 signal cable is supplied to allow interconnection between the CD SELECT input and the SELECT output of the CD8828B.

CAMAC COMMANDS

- Z,C, Power-Up:** Places unit in inactive state, cancels inhibit.
- F(24)•A(1):** Inhibits unit — front panel operations will not generate CAMAC bus operations. This is a user strap selectable option.
- F(25)•A(1):** Same as Z, C or power-up.
- F(26)•A(1):** Clears inhibit.

SECTION 1

OPERATIONAL DESCRIPTION

1.1 Introduction

The CD8828B provides manual control and display capabilities. Data from any transient recorder in a CAMAC crate can be displayed by the resident CD8828B. Protocol assures that computer controlled experiments can proceed without bus contention.

The Model CD8828B Control and Display Module is a supplementary module to the new generation of high performance low cost transient recorders offered by LeCroy. By isolating manual control and display capabilities in a separate module, higher density instruments can be configured without sacrificing features and cost effectiveness.

1.2 GENERAL OPERATION

To Start, Stop, set the sampling parameters of or display data from any of the supported transient recorders, the transient recorder must have its CD SELECT input connected to the SELECT output on the control and display unit.

Control: The unit may be started and triggered by using the RECORD/STOP TRIGGER SWITCH.

Setup: The desired sampling parameters are entered using front panel rotary and dip switches. These parameters are then sent via the CAMAC dataway to the instrument when the appropriate EXECUTE switch is toggled.

Display: To display data from a transient recorder, the correct data format is selected using the DATA FORMAT rotary switch and then DISPLAY ON is depressed. The CD8828B then retrieves the data from the connected/selected transient recorder for display.

Display rate per samples is nominally 200 kHz for the TR8837F (1x8 format) and 400 kHz for the TR8818 and TR8828 (2x8 format). The sweep rate depends on the memory size and can be calculated by dividing memory size by the appropriate sample rate above.

1.3 FRONT PANEL INDICATORS AND CONTROLS

ACTIVE: LED is lit when unit is using the CAMAC data bus for transferring data/commands.

INHIBIT: LED is lit to indicate that the unit is inhibited, that is no front panel operations will permit bus operation. See F(24)•A(1) and F(26)•A(1) under CAMAC commands.

POWER: LED is lit when the correct operational voltages are supplied to the CD8828B. Will not necessarily indicate overvoltages.

CLOCK

FREQUENCY: Rotary switch sets the sampling interval for the supported transient recorders. The selection is made in fractions of the master oscillator. For example if the switch is set to F/2 for the TR8837F 32 MHz transient recorder, the sampling rate will be 16 MHz. The value selection must be succeeded by an EXECUTE, to actually load the value into the transient recorder.

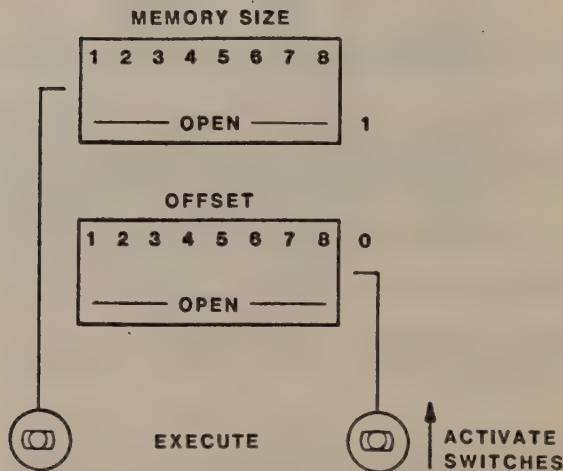
PRE

TRIGGER: Rotary switch sets the pretrigger record length in eighths of the total record length. The value selection must be succeeded by an EXECUTE, to actually load the value into the transient recorder.

MEMORY

SIZE: Dip switches. DATA entered using dip switches d8-d1 corresponds to data written to the transient recorders on the CAMAC W9-W16 lines using an F(16)•A(0).

The orientation of the dip rocker switches is as shown below:



Depending on the switch manufacturer, the switch labels may vary from that shown.

"OPEN" or "OFF" corresponds to a logical "1" or "TRUE".

The table below gives the dip switch settings which must be set to achieve the corresponding memory size, for the supported transient recorders.

d1-d8	TR8837F	TR8818	TR8828B
00000000	1K	8K	16K
00000001	2K	16K	32K
00000010	3K	24K	48K
00000011	4K	32K	64K
00000100	5K	40K	80K
00000101	6K	48K	96K
00000110	7K	56K	112K
00000111	8K	64K	128K
00001000	-	72K	144K
00001001	-	80K	160K
00001010	-	88K	176K
.	-	.	.
.	-	.	.
11111111	-	512K	512K MAXIMUM

OFFSET: Dip switches. The ± 256 mV offset of the transient recorders is settable using these 8 dip switches. The 8 bits of the dip switch settings d8-d1 correspond to the 8 bits which are written into the instrumentation modules using F(19).A(0). OFFSET is not used for the TR8837, which does not have programmable offset. The table below gives the sum of the dip switch settings and the corresponding offset value that will be set when EXECUTE is performed.

d1-d8	OFFSET (approx.)
00000000	-256 mV
00011100	-200 mV
01001110	-100 mV
10000000	0 mV
10110010	+100 mV
11100100	+200 mV
11111111	+255 mV

EXECUTE: Two single throw switches. Used to enter the selected sampling parameters into the connected transient recorder. Throwing the left switch upward enters the CLOCK FREQUENCY, PRETRIGGER, and MEM SIZE. Throwing the right switch upward enters the OFFSET value.

START/STOP

TRIGGER: Double throw switch. Upward deflection starts selected transient recorder. Downward deflection issues a stop trigger to the selected digitizer and automatically puts unit in Display mode. (CAUTION: Random multiple throws may cause the module to enter an improper state. This should cause no problems, and can be recovered from by a normal sequence of switches.)

DATA

FORMAT: Rotary Switch, selects the correct data decoding mode for the control and display unit. It is used to distinguish between different resolution and differently formatted transient recorder data. Set to 8 BITS for model TR8837F. Set to 2 X 8 BITS for the TR8818 and TR8828B. The zero position outputs zero volts reference at the analog output for referencing the external scope.

ANALOG: 0 V to 2.5 V output, $Z=50\ \Omega$, drives oscilloscope.

TRIGGER: 0 V to -2.0 V, output precursor to first sample in record.

SELECT: Output, TTL. Must be connected to the CD SELECT input of the transient recorder which is going to have its sampling parameters modified or data viewed.

1.4 CAMAC COMMANDS

Z, C,

Power-up: Places unit in inactive state, canceled inhibit.

F(24)•A(1): Strap selectable option inhibits front panel controls. The module is shipped with E1 to E2 unstrapped. This strap must be inserted by the user to enable the CAMAC F(24)•A1 inhibit mode.

F(25)•A(1): Same as Z, C or power-up.

F(26)•A(1): Clears inhibit.

SECTION 2

FUNCTIONAL DESCRIPTION

(See Block Diagram)

2.1 POWER GENERATION AND REQUIREMENTS

The +6 V at 500 mA is used to derive the +5.2 V for the logic and the sense circuit for the front panel POWER ON indication. The +24 V at 100 mA sources the +12 V regulator (VR-2) which supplies the POWER ON sense circuit and the module amplifiers and dac.

The -24 V at 100 mA sources the -12 V regulator (VR-1) which supplies the POWER ON sense circuit and the module amplifiers, dac, and reference for TRIGGER OUT.

2.2 CIRCUIT DESCRIPTION

Activating the appropriate front panel momentary switch causes the output of the respective quad set-reset latch (LS279, 6H, or 7H) to go high. (This output will reset low when the switch is released) The output going high clocks the appropriate dual flip-flop (3H, 4H, or 5J). Since the flip-flop data input is tied high the Q output will go low, generating the appropriate F code.

F(19) enables the dataway nand gate bus drivers 8A, 8B, 8C, and 8D (7438) through the buffer nand gate 7C (LS37).

F(16) enables the dataway nand gate bus drivers 6A, 7A, 8A, 8B, 8C, 8D, (7438) through the buffer nand gate 7C (LS37).

This allows the data set from the front panel (i.e. offset or memory size, pretrig, and clk freq) to be transferred to the dataway write lines.

The generated F function is also encoded through buffers 3F, 4D, 4F as required and enables the appropriate nand gate bus drivers 4C (7438) to activate the proper dataway F lines that represents the function that was active. In addition any F code is sensed at the 8-input nand gate 4J (LS30) resulting in 4J output going high for the duration of the cycle.

This pulse generates four additional operations:

- 1) Busy signal is gated to dataway through bus drivers 2C, select output is activated, and one shot is triggered to energize ACTIVE LED.

- 2) Delayed one shot 5G, 3G is triggered to generate S1 strobe on dataway via bus driver 5D.
- 3) Delayed one shot 5G, 3G is triggered to generate S2 strobe on dataway via bus driver 5D.
- 4) Delayed negative going end cycle pulse is generated at output pin 11 of 4F and used to reset flip-flops 3H, 4H, and 5J.

F(17) is activated by commanding the display mode from the front panel, and tells the listening module; set the Q line true, initialize your memory to the starting address, issue data when you receive an F(2) command and then increment address, and issue Q false when record is finished reading.

The F(17) cycle is generated as stated previously by activating the front panel display switch. The high going clock pulse to 5J-11 is differentiated by the pseudo one shot C81-R47-R48-3G and ored through 3F. Therefore holding the display switch active will not maintain a high clock pulse.

Any F(17) cycle will set the output of LS79-7H pin 4. This high at the end of the F(17) cycle will enable the gated 1.5 μ sec internal oscillator (4F and 3G). 3G-6 output is the unit clock pulse and is divided by two in 7G (LS112). The 7G-Q output is put out on the dataway bus as F(2).

These F(2) commands are continuous on the bus as long as the listening module responds with a Q=1. When the record is finished the listener will release the Q line to indicate the completion.

Q=0 is sensed at pin 12 of 7G (LS112). The next clock pulse will disable the gated internal oscillator by resetting 7H pin 4. A delayed output is (pin 7 of 7G) ored with the manual display command and used to generate another F(17) command cycle.

Every F(17) cycle sets 7G (pin 10) back to the initial state. The module exits the display state when the front panel display switch is depressed. This generates a master reset.

2.3 DISPLAY

The CD8828B is designed to interface with LeCroy TR modules with samples stored into memory formatted as 8 bits, 2 X 8 bits, 10 bits, or 12 bits.

The setting of this front panel switch determines the reference voltage presented to the display dac (10B) via 11C (LM318) and 11D (ref-02). R34, R32, and R33 adjust the analog out span for formats 8 and 2 X 8, 10, and 12 bits respectively. Also 9J (LS32), 9F and 9G (LS08) decode the output enable commands for the storage registers 9A, 10A, and 11A (LS374). The scope sync pulse is derived from F(17) leading edge and outputted via Q3. During F(17) active time the storage registers are in the high impedance state.

Since the dac (10B) is operated in the complemented bits mode the dac output will be zero at this time. Therefore if the external scope is synchronized on the approximately -2 V sync pulse the analog output will be restored to zero AT THE BEGINNING OF EACH SWEEP.

The dac (10B) output is converted to a voltage output at 10C (LM318). Q2 (2N222A) forms a feed back loop with the LM318 to allow the analog output to drive a 50 Ω load.

2.4 CAMAC INTERFACE

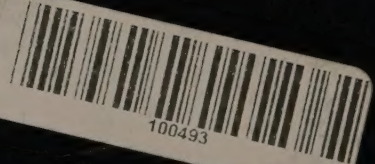
The CD8828B will comply with the following dataway commands:

- 1) C or Z strobed with S2 will reset the module to the power up state (inactive).
- 2) N•F(24)•A1 (if module strap E1 to E2 in place) will disable the module until N•F(26)•A1 is issued. During this time the front panel inhibit indication will be energized. The module will then be in the inactive but not disabled state. This is the same state as power up.
- 3) N•F(25)•A1 will reset the unit to the inactive but not disabled state.

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